

CLAIMS

What is claimed is:

1 1. Method for selecting and providing polymers for use in
2 outgassing-sensitive environments, the method comprising:
3 selecting a suitable addition polymerizing material;
4 determining a quantity of said material for a single
5 application;
6 mixing a quantity of said selected material in a batch of at
7 least four times the quantity for the single application, said
8 mixing resulting in combining component parts of said addition
9 polymerizing material for polymerization, whereby said mixing is
10 provided at stoichiometric proportions within 2% by weight;
11 subdividing the batch into single application quantities;
12 placing a plurality of the application quantities in a chilled
13 environment such that polymerization is retarded sufficiently for
14 anticipated future use of the plurality of said application
15 quantities as pre-mixed frozen (PMF) material; and
16 providing individual ones of the application quantities for
17 use in the outgassing-sensitive environments, thereby permitting
18 cold storage of unused application quantities retained for future
19 use while providing said individual ones of the application
20 quantities for use as desired.

1 2. Method as described in claim 1, wherein the addition
2 polymerizing material includes two-part epoxy.

1 3. Method as described in claim 1, wherein the addition
2 polymerizing material includes epoxy which utilizes an amine adduct curing
3 agent which is a product of poly-functional amines and mono-functional
4 epoxy intermediate materials.

1 4. Method as described in claim 1, wherein the addition
2 polymerizing material includes a silicone polymer which achieves curing by
3 vinyl polymerization.

1 5. Method as described in claim 1, further comprising:
2 applying one of said individual quantities in assembling
3 components for use in an outgassing-sensitive environment;
4 outgassing the assembled components for at least one
5 day;
6 performing total material loss (TML) and collected volatile
7 condensable materials (CVCM) tests subsequent to said
8 outgassing, said TML and CVCM tests performed at least once
9 for a given combination of polymer and configuration in the
10 outgassing-sensitive environment; and
11 using data from said TML and CVCM tests to verify the
12 polymers are suitable for use in the given configuration in an
13 outgassing-sensitive environment.

1 6. Method as described in claim 1, further comprising:
2 applying one of said individual quantities in assembling
3 components for use in an outgassing-sensitive environment;
4 outgassing the assembled components for at least one
5 day in a high vacuum environment of pressure lower than
6 10^{-6} torr; and
7 performing total material loss (TML) and collected volatile
8 condensable materials (CVCM) tests subsequent to said
9 outgassing, said TML and CVCM testing performed at least
10 once for a given combination of polymer and configuration in
11 the outgassing-sensitive environment.

1 7. Method as described in claim 1, further comprising:

2 applying one of said individual quantities in assembling
 3 components for use in an outgassing-sensitive environment;
 4 outgassing the assembled components for at least one
 5 day in a high vacuum environment of pressure lower than
 6 10^{-6} torr and at least 30°C; and
 7 performing total material loss (TML) and collected volatile
 8 condensable materials (CVCM) tests subsequent to said
 9 outgassing, said TML and CVCM testing performed at least
 10 once for a given combination of polymer and configuration in
 11 the outgassing-sensitive environment.

1 8. Method as described in claim 1, further comprising
 2 outgassing the assembled components to deplete trapped and dissolved
 3 gases, including:
 4 nitrogen, oxygen and water,
 5 solvents, if any, used during cleaning processes,
 6 low molecular weight hydrocarbons and amines from the
 7 component parts of said addition polymerizing material, and
 8 residual and unreacted material from said component
 9 parts of said addition polymerizing material.

1 9. Method as described in claim 1, further comprising:
 2 applying one of said individual quantities in assembling
 3 components for use in an outgassing-sensitive environment;
 4 outgassing the assembled components for at least one
 5 day in a high vacuum environment of pressure lower than
 6 10^{-6} torr and at least 30°C, said outgassing depleting trapped
 7 and dissolved gases, including nitrogen, oxygen and water,
 8 solvents, if any, used during cleaning processes, low molecular
 9 weight hydrocarbons and amines from the component parts of
 10 said addition polymerizing material, and residual and unreacted

11 material from said component parts of said addition polymerizing
12 material.

1 10. Method for assembling optics, the method comprising:
2 selecting an addition polymerizing polymer suitable for
3 use in an outgassing-sensitive environment;
4 determining a quantity of said material for a single
5 application;
6 mixing a quantity of said selected material in a batch of at
7 least four times the quantity for the single application, said
8 mixing resulting in combining component parts of said addition
9 polymerizing material for polymerization, whereby said mixing is
10 provided at stoichiometric proportions within 2% by weight;
11 subdividing the batch into single application quantities;
12 placing a plurality of the application quantities in a chilled
13 environment such that polymerization is retarded sufficiently for
14 anticipated future use of the plurality of said application
15 quantities as pre-mixed frozen (PMF) material;
16 providing individual ones of the application quantities for
17 use in the outgassing-sensitive environments, thereby permitting
18 cold storage of unused application quantities retained for future
19 use while providing said individual ones of the application
20 quantities for use as desired; and
21 assembling at least one component of the optics by
22 bonding with said PMF material.

1 11. Method as described in claim 10, wherein the addition
2 polymerizing material includes epoxy which utilizes an amine adduct curing
3 agent which is a product of poly-functional amines and mono-functional
4 epoxy intermediate materials.

1 12. Method as described in claim 10, wherein the addition
2 polymerizing material includes a silicone polymer which achieves curing by
3 vinyl polymerization.

1 13. Method as described in claim 10, further comprising:
2 applying one of said individual quantities in assembling
3 components for use in an outgassing-sensitive environment;
4 outgassing the assembled components for at least one
5 day;
6 performing total material loss (TML) and collected volatile
7 condensable materials (CVCM) tests subsequent to said
8 outgassing, said TML and CVCM tests performed at least once
9 for a given combination of polymer and configuration in the
10 outgassing-sensitive environment; and
11 using data from said TML and CVCM tests to verify the
12 polymers are suitable for use in the given configuration in an
13 outgassing-sensitive environment.

1 14. Method as described in claim 10, further comprising:
2 applying one of said individual quantities in assembling
3 components for use in an outgassing-sensitive environment;
4 outgassing the assembled components for at least one
5 day in a high vacuum environment of pressure lower than
6 10^{-6} torr; and
7 performing total material loss (TML) and collected volatile
8 condensable materials (CVCM) tests subsequent to said
9 outgassing, said TML and CVCM testing performed at least
10 once for a given combination of polymer and configuration in
11 the outgassing-sensitive environment.

1 15. Method as described in claim 10, further comprising:

2 applying one of said individual quantities in assembling
3 components for use in an outgassing-sensitive environment;

4 outgassing the assembled components for at least one
5 day in a high vacuum environment of pressure lower than
6 10^{-6} torr and at least 30°C; and

7 performing total material loss (TML) and collected volatile
8 condensable materials (CVCM) tests subsequent to said
9 outgassing, said TML and CVCM testing performed at least
10 once for a given combination of polymer and configuration in
11 the outgassing-sensitive environment.

1 16. Method as described in claim 10, further comprising
2 outgassing the assembled components to deplete trapped and dissolved
3 gases, including:

4 nitrogen, oxygen and water,
5 solvents, if any, used during cleaning processes,
6 low molecular weight hydrocarbons and amines from the
7 component parts of said addition polymerizing material, and
8 residual and unreacted material from said component
9 parts of said addition polymerizing material.

1 17. Method as described in claim 10, further comprising:

2 applying one of said individual quantities in assembling
3 components for use in an outgassing-sensitive environment;

4 outgassing the assembled components for at least one
5 day in a high vacuum environment of pressure lower than
6 10^{-6} torr and at least 30°C, said outgassing depleting trapped
7 and dissolved gases, including nitrogen, oxygen and water,
8 solvents, if any, used during cleaning processes, low molecular
9 weight hydrocarbons and amines from the component parts of
10 said addition polymerizing material, and residual and unreacted

11 material from said component parts of said addition polymerizing
12 material.

1 18. A polymer for use in outgassing-sensitive environments,
2 comprising:
3 suitable addition polymerizing material selected to provide
4 low total material loss (TML) and collected volatile condensable
5 materials (CVCM) values, said addition polymerizing material
6 mixed by determining a quantity of said material for a single
7 application, mixing a quantity of said selected material at
8 stoichiometric proportions within 2% by weight in a batch of at
9 least four times the quantity for the single application, said
10 mixing resulting in combining component parts of said addition
11 polymerizing material for polymerization, subdividing the batch
12 into single application quantities, and placing a plurality of the
13 application quantities in a chilled environment such that
14 polymerization is retarded sufficiently for anticipated future use
15 of the plurality of said application quantities as pre-mixed frozen
16 (PMF) material; and
17 the mixed polymerizing material provided in individual
18 ones of the application quantities for use in the
19 outgassing-sensitive environments, thereby permitting cold
20 storage of unused application quantities retained for future use
21 while providing said individual ones of the application quantities
22 for use as desired.

1 19. A polymer as described in claim 18, wherein the addition
2 polymerizing material includes epoxy which utilizes an amine adduct curing
3 agent which is a product of poly-functional amines and mono-functional
4 epoxy intermediate materials.

1 20. A polymer as described in claim 18, wherein the addition
2 polymerizing material includes a silicone polymer which achieves curing by
3 vinyl polymerization.

1 21. A polymer as described in claim 18, wherein the polymer
2 is outgassed by outgassing by placing an assembly using the polymer for at
3 least one day in a high vacuum environment of pressure lower than 10^{-6} torr
4 and at least 30°C.

1 22. A polymer as described in claim 18, wherein the polymer
2 is outgassed by outgassing by placing an assembly using the polymer for at
3 least one day in a high vacuum environment of pressure lower than 10^{-6} torr
4 and at least 30°C to deplete trapped and dissolved gases, including:

5 nitrogen, oxygen and water,

6 solvents, if any, used during cleaning processes,

7 low molecular weight hydrocarbons and amines from the
8 component parts of said addition polymerizing material, and

9 residual and unreacted material from said component
10 parts of said addition polymerizing material.